

Waves Review 2

Name - \_\_\_\_\_

- 1.) If waves maintain a constant speed while passing through the same medium, what will happen to the wavelength if the frequency is doubled, and if the amplitude is doubled?

If the frequency is doubled while the speed is maintained then the wavelength must be half the length.

If the frequency is doubled and the speed is maintained NOTHING must happen to the amplitude as this is a measure of the energy in the wave which is independent of frequency and speed.

- 2.) What is the frequency of a sound wave if its wavelength is  $1.70\text{ m}$  and the speed of sound is  $340\frac{\text{m}}{\text{s}}$ ?

Answer -  $v = \lambda f$        $340 = 1.70f$        $f = 200\text{ Hz}$

- 3.) Waves of  $f = 2.0\text{ Hz}$  are transmitted through a steel spring, what is the wavelength if the spring is  $4.0\text{ m}$  long and waves take  $1.1 \times 10^{-2}\text{ s}$  to travel its length?

Answer -  $v_{avg} = \frac{\Delta d}{\Delta t}$        $v_{avg} = \frac{4.0}{1.1 \times 10^{-2}}$        $v_{avg} = 363.636\frac{\text{m}}{\text{s}}$

$v = \lambda f$        $363.636 = \lambda 2.0$        $\lambda = 1.8 \times 10^2\text{ m}$

- 4.) A student measures the speed of water waves to be  $0.25\frac{\text{m}}{\text{s}}$ , and the wavelength to be  $0.025\text{ m}$ , find the frequency.

Answer -  $v = \lambda f$        $0.25 = 0.025f$        $f = 10.\text{ Hz}$

- 5.) A  $600.\text{ nm}$  light wave has what frequency and what color would it appear as?

Answer -  $v = \lambda f$        $3.0 \times 10^8 = 6.0 \times 10^{-7}f$        $f = 5.00 \times 10^{14}\text{ Hz}$       orangy-yellow

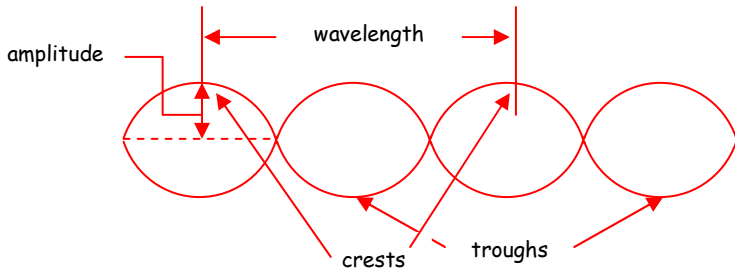
- 6.) What is the wavelength of a microwave whose frequency is  $3.0 \times 10^{10}\text{ Hz}$ ?

Answer -  $v = \lambda f$        $3.0 \times 10^8 = \lambda 3.0 \times 10^{10}$        $\lambda = 0.01\text{ m}$

7.) What is the difference between a pulse and a wave?

A pulse is a single disturbance of a medium where as a wave is the continual disturbance of the wave.

8.) Sketch a wave of  $4f_0$ , show crests, troughs, the wavelength, frequency, and amplitude.



Frequency is # of wavelengths/second

Frequency for this standing wave is  $4f_0$

9.) How are period and frequency related?

Period is the inverse of frequency.

10.) A dog wags its tail 50 times in 20 s, find its frequency and period.

Answer - frequency is vibrations per second so  $f = \frac{\text{wags}}{\text{time}}$        $f = \frac{50}{20}$        $f = 2.5 \text{ Hz}$

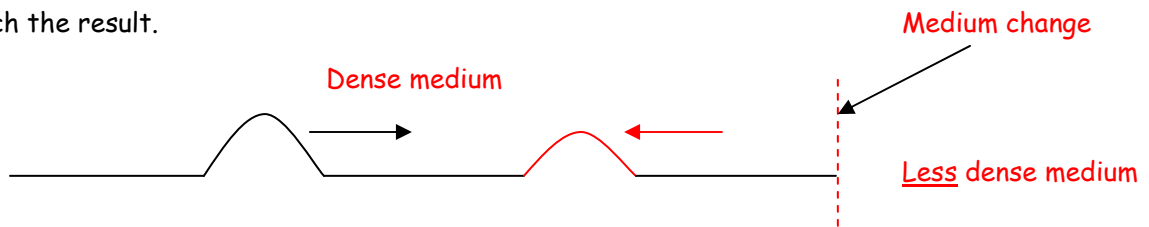
Period is the inverse of frequency so  $T = \frac{1}{2.5}$        $T = 0.4 \text{ s}$

11.) What is the difference between a transverse and a longitudinal wave?

Transverse has the particle movement perpendicular to the wave direction and longitudinal has the particle parallel to the wave direction.

12.) A wave travels from a dense medium to a less dense medium, the media are significantly different.

Sketch the result.

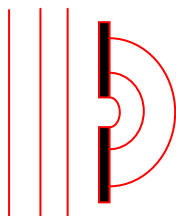


13.) Sketch two pulses which will exhibit constructive interference. Repeat for destructive interference.

interference.



14.) Sketch single slit diffraction.



15.) A siren approaches you, as a result of Doppler shift its frequency will be higher, wavelength will be shorter, and sound will be higher.

16.) Sketch the result of the two pulses meeting, what is the principle called which causes this result?



17.) Waves on Okanagan Lake pass by a point every 1.5 s. If they travel 20. m in 30. seconds find their speed, frequency, and wavelength.

Answer -  $\vec{v} = \frac{\Delta d}{\Delta t}$        $\vec{v} = \frac{20}{30}$        $\vec{v} = +0.667 \frac{m}{s}$

$f = \frac{1}{T}$        $f = \frac{1}{1.5}$        $f = 0.667 \text{ Hz}$

$\vec{v} = \lambda f$        $0.667 = \lambda 0.667$        $\lambda = 1.0 \text{ m}$